

MEASUREMENT OF FRICTION FORCE AND HYSTERESIS

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This presentation reviews issues associated with measurement of frictional properties and describes the development of an experimental method to accurately infer friction force as a function of relative motion. Because friction force is not directly measured but inferred from the response of a system to effects of friction, discerning the direct cause-and-effect between friction and its influence becomes a challenge. The method used here utilizes a test configuration that minimizes the influence of forces other than friction. The presentation describes the hysteresis cycles that result from measurements of friction force and relative displacement between two surfaces undergoing small-amplitude tangential relative motion. These measurements also produce contact parameters such as friction coefficient and tangential contact stiffness. Because most of these parameters exhibit strong sensitivity to measurement errors, this paper also addresses issues related to potential errors in such measurements and makes recommendations to minimize their effects. Preliminary tests verify the accuracy and repeatability of the measurements and the results compare well with analytical predictions.